Claims

1. A method of generating an auxiliary symbol (Sh) when a digital signal (s) locked to a quadrature signal pair (I, Q) is received, the method comprising the steps of:

a) determining nominal radii (Rs) and range limits, particularly radii limits (Rg), according to predetermined positions (Sm,n) of the digital signal (s) in the plane determined by the quadrature signal pair (I, Q);

b) determining preliminary symbols (S) from the digital signal (s) by means of a sampling device (10) controlled by a symbol sampling clock (ts);

c) determining the polar coordinates (R, α) of the preliminary symbol (S);

d) determining a nominal radius (Rsi) from the polar coordinates (R, α), particularly from the radius component (R), according to the range limits; and

e) the nominal radius (Rsi) and the angle component (α) define the polar coodinates of the auxiliary symbol (Sh) in the plane of the quadrature signal pair (I, Q).

2. A method as claimed in claim 1, characterized in that the polar coordinates (Rsi, α) of the auxiliary symbol (Sh) are converted into a Cartesian coordinate system determined by the quadrature signal pair (I, Q).

3. A method as claimed in claim 1 or 2, characterized in that the digital signal (s) is a digitized signal (sd) which is digitized by means of a sampling and digitization device (3) locked to a digitization clock (td), and that for the formation of the preliminary symbol (S), a temporal interpolation of the digitized signal (sd) takes place in the sampling device (10) as a function of the respective instant of the symbol sampling clock (ts) when the digitization clock (td) and the symbol sampling clock (ts) are independent of each other in frequency and/or phase.

4. A method as claimed in claim 1 or 2, characterized in that the digital signal (s) is a digitized signal (sd) which is digitized by means of a sampling and digitization device (3) locked to a digitization clock (td'), and that for the formation of the preliminary

symbol (S), one of the subsequent devices (10; 14) takes from the digitized signal (sd) that data value which corresponds to the respective instant of the symbol sampling clock (ts) when the digitization clock (td) and the symbol sampling clock (ts) are mutually dependent in frequency and/or phase.

5. A method as claimed in claim 1, characterized in that only a selection of the nominal radii (Rs) is available for the generation of auxiliary symbol (Sh).

6. A method as claimed in claim 5, characterized in that weighting factors are combined with the nominal radii (Rs).

7. A method as claimed in claim 1, characterized in that at least one of the range limits is defined by a radius limit (Rgi; Rgi'; Rsi+; Rsi-).

8. A method as claimed in claim 7, characterized in that at least one of the radius limits (Rgi'; Rsi+; Rsi-) does not lie midway between the adjacent nominal radii (Rs).

9. A method as claimed in claim 1, 7, or 8, characterized in that the range limits between two adjacent nominal radii (Rs) are so defined that part of the range between the two adjacent nominal radii (Rs) is masked out for the generation of the auxiliary symbol (Sh).

10. A method as claimed in any one of claims 1 to 9,

characterized in that for the acquisition process of decision-feedback controllers (11, 13, 14; 40, 13, 14) during reception of the digital signal (s), a decision symbol (Se) is replaced by the auxiliary symbol (Sh).

11. A circuit arrangement for generating an auxiliary symbol (Sh) from a preliminary symbol (S) in a device (1; 1) for receiving a digital signal (s) locked to a quadrature signal pair (I, Q), comprising:

- a resolver (20) which converts the Cartesian quadrature signal components (I, Q) of the preliminary symbol (S) into polar coordinates (R, α); and

- a radius decision stage (21) which determines from the polar coordinates (R, α) of the preliminary symbol (S) the most probable nominal radius (Rsi) which, together with the angle component (α) of the preliminary symbol (S), defines the polar coordinates (Rsi, α) of the auxiliary symbol (Sh).

12. A circuit arrangement as claimed in claim 11, characterized in that a further resolver (23) converts the polar coordinates (Rsi, α) of the auxiliary symbol (Sh) to Cartesian coordinates (Ih, Qh) in the plane determined by the quadrature signal pair (I, Q).

13. A circuit arrangement as claimed in claim 12, characterized in that the auxiliary symbol (Sh) is used as a decision symbol (Se) to control at least one decision-feedback controller (11, 13, 14; 40, 13, 14) in the device (1; 1).

14. A circuit arrangement as claimed in claim 13, characterized in that during the adjustment process, the auxiliary symbol (Sh) is fed to the at least one decision-feedback controller (11, 13, 14; 40, 13, 14) via a multiplexer (18) controlled by a controller (19).

15. A circuit arrangement as claimed in claim 14, characterized in that the multiplexer (19) has its other signal input connected to a symbol decision stage (15) for decision symbols (Se), and that the multiplexer is switched from the auxiliary symbol (Sh) to a decision symbol (Se) under control the controller (19) when the decision symbol (Se) definitely lies within the capture range of the respective decision-feedback controller (11, 13, 14; 40, 13, 14).

16. A circuit arrangement as claimed in any one of claims 11 to 15, characterized in that the device (1; 1) is a demodulator which is fed with the digital signal (s) and delivers the decision symbols (Se) as a data stream.